CLAIMS

What is claimed is:

1. A method for determining the presence or absence of a CYP2D6 target sequence in a sample of DNA containing nucleic acid corresponding to CYP2D6, comprising

contacting said nucleic acid with a probe under stringent binding conditions, and detecting the presence or absence of target sequence bound with said probe, wherein said target sequence or said probe is bound with scattered light detectable particle, and said detecting comprises observing light scattered from said particle as an indication of said presence or absence.

2. The method of claim 1, further comprising amplifying a portion of said nucleic acid corresponding to CYP2D6, and contacting the amplified nucleic acid with said probe.

3. The method of claim 1, wherein a plurality of capture probes comprising nucleotide sequence complementary to nucleic acid corresponding to CYP2D6 are immobilized on a solid surface.

4. The method of claim 1, wherein said determining the presence or absence of at least one target sequence in said nucleic acid corresponding to CYP2D6 comprises determining the presence or absence of a plurality of target sequences using a plurality of different probes.

5. The method of claim 4, wherein the presence or absence of said plurality of target sequences identifies at least one CYP2D6 allele.

6. The method of claim 4, wherein a plurality of different nucleic acid molecules corresponding to CYP2D6 is immobilized at different spots on a solid surface.

7. The method of claim 1, further comprising demonstrating that nucleic acid sequence from CYP27D or CYP2D8 pseudogenes or both is not amplified.

8. The method of claim 5, wherein said at least one allele comprises a plurality of alleles.

9. The method of claim 1, wherein said target sequence is labeled by incorporation labeling.

10. An amplification oligonucleotide primer adapted for amplifying a portion of a CYP2D6 gene comprising a sequence polymorphism, wherein said oligonucleotide binds to an intron of said CYP2D6 gene.

11. The primer of claim 10, wherein said primer is a gene-specific primer.

12. The amplification oligonucleotide primer of claim 11, wherein said primer hybridizes under stringent hybridization conditions to a CYP2D6 target site, wherein said primer contains at least one nucleotide at the 3' end that base pairs with a complementary nucleotide in a CYP2D6 target sequence in at least one allele and does not base pair with a complementary nucleotide in a CYP2D6 target sequence in at least one different allele.

13. The primer of claim 11, wherein said primer is an allele-specific primer.

14. The amplification oligonucleotide primer of claim 11, wherein said oligonucleotide comprises a sequence selected from the group consisting of
5'-CTCGGCCCCTGCACTGTTTC-3',
5'-GCTTTGTCCAAGAGACCGTTG-3',
5'-CTCGGAAGAGCAGGATTTGCGTA-3',
5'-CCTGACCCAGCTGGATGAG-3', and
5'-CTTCCCTGAGTGCAAAGGCG-3'.

15. An amplification oligonucleotide primer adapted for amplifying a portion of a CYP2D6 gene comprising a sequence polymorphism, wherein said primer is a gene-specific primer.

16. An allele specific probe, comprising a molecule that preferentially binds to a labeled CYP2D6 target nucleic acid sequence at least partially comprising a sequence corresponding to a polymorphism in a CYP2D6 gene, wherein a scattered light detectable particle 1-500 nm in size is bound with said probe.

17. The probe of claim 16, wherein said probe comprises a nucleotide sequence that is at least 80% complementary to said CYP2D6 target nucleic acid sequence.

18. The probe of claim 20, wherein said probe comprises a nucleotide sequence that is designed to discriminate different allelic forms of at least one CYP2D6 target nucleic acid sequence.

19. The probe of claim 16, further comprising a spacer region.

20. The probe of claim 19 wherein said spacer region comprises a polynucleotide tail.

21. The probe of claim 20, wherein said polynucleotide tail is 10-50 nucleotides in length.

22. A labeled target nucleic acid molecule corresponding to a polymorphic site-containing portion of CYP2D6, wherein said label provides binding of a light scattering particle.

23. The molecule of claim 22, wherein said label is a hapten.

24. The molecule of claim 23, wherein a specific hapten-binding molecule bound with a light scattering particle is bound to said hapten.

25. The molecule of claim 22, wherein said label is a modified nucleotide.

26. The molecule of claim 25, wherein an antibody recognizing said modified nucleotide is bound to said molecule and said antibody is bound with a light scattering particle.

27. An isolated CYP2D6 nucleic acid sequence, wherein said nucleic acid sequence is bound with a probe and said nucleic acid sequence or said probe is bound with a scattered light detectable particle.

28. The nucleic acid sequence of claim 27, wherein said probe is a detection probe with a scattered light detectable particle bound to said probe.

29. The nucleic acid sequence of claim 27, wherein said probe is a capture probe.

30. The nucleic acid molecule of claim 27, wherein said probe is an allele-specific probe.

31. The nucleic acid sequence of claim 27, wherein said scattered light detectable particle includes or is bound to a first member of a binding pair, said first member of a binding pair is bound with the second member of the binding pair; and said second member of the binding pair is bound with said probe or said nucleic acid sequence.

32. The nucleic acid sequence of claim 27, wherein said sequence comprises an incorporated label.

33. The nucleic acid sequence of claim 32, wherein said label is a hapten.

34. The nucleic acid sequence of claim 32, wherein said label is a modified nucleotide recognized by an antibody.

35. A method for determining the presence of a CYP2D6 allele in a nucleic acid sample that may contain nucleic acid corresponding to CYP2D6, comprising

contacting said nucleic acid sample with at least one allele-specific probe under conditions wherein said at least one probe specifically binds to any said nucleic acid corresponding to CYP2D6 in said sample that includes a specific sequence polymorphism and not to nucleic acid corresponding to CYP2D6 that does not include said specific sequence polymorphism,

binding said nucleic acid corresponding to CYP2D6 that includes said specific sequence polymorphism or said probe with a scattered-light detectable particle of a size between 1 and 500 nm inclusive;

illuminating any said particles associated with probe bound with said nucleic acid corresponding to CYP2D6 with light under conditions which produce scattered light from said particles and in which light scattered from one or more said particles can be detected; and

detecting said light scattered by any said particles under said conditions as a measure of the presence of said nucleic acid corresponding to CYP2D6 including said specific sequence polymorphism.

36. The method of claim 35, where said illuminating is with non-evanescent wave, and said scattered light can be detected by a human eye with less than 500 times magnification and without electronic amplification.

37. The method of claim 35, wherein said probe comprises a nucleic acid sequence that hybridizes with said nucleic acid corresponding to CYP2D6.

38. The method of claim 35, further comprising labeling nucleic acid corresponding to CYP2D6 by incorporation labeling.

39. A kit adapted for determination of the presence of at least one CYP2D6 sequence polymorphism in CYPD6 nucleic acid, comprising

at least one solid phase array, wherein said array chip is adapted to bind CYP2D6 nucleic acid at a plurality of spots;

at least one allele specific probe that specifically binds to a CYP2D6 target sequence; and

at least one distinguishable type of scattered light detectable particle 1 to 500 nm in size that binds to said CYP2D6 nucleic acid.

40. The kit of claim 39, wherein said solid phase array is adapted to bind a plurality of different CYP2D6 nucleic acid molecules at different spots.

41. The kit of claim 39, wherein said at least one allele-specific probe comprises a plurality of different allele-specific probes.

42. The kit of claim 39, wherein said allele-specific probe is a capture probe bound on said solid phase array.

43. The kit of claim 39, further comprising one or more components for incorporation labeling of target nucleic acid.

44. The kit of claim 43, wherein said components comprise at least one component selected from the group consisting of a DNA polymerase, a modified nucleotide comprising a hapten, and a modified nucleotide comprising a modified nucleotide recognized by an antibody.

45. The kit of claim 39, wherein said at least one distinguishable type is a plurality of distinguishable types.

46. A kit adapted for determination of the presence of at least one CYP2D6 sequence polymorphism in CYP2D6 target nucleic acid, comprising

at least one allele-specific probe that specifically binds to a CYP2D6 target sequence; and

at least one distinguishable type scattered light detectable particle adapted to bind with said allele-specific probe or with said target sequence.

47. The kit of claim 46, further comprising at least one CYP2D6 solid phase array.

48. The kit of claim 46, wherein said at least one allele-specific probe comprises a plurality of different allele-specific probes.

49. The kit of claim 46, wherein said at least one type scattered light detectable particle is bound to said at least one allele-specific probe.

50. The kit of claim 46, wherein said at least one type scattered light detectable particle is a plurality of different type particles.

51. The kit of claim 46, further comprising at least one amplification oligonucleotide primer adapted to bind to or extend through a CYP2D6 polymorphic site.

52. The kit of claim 51, wherein said at least one amplification oligonucleotide primers comprises a plurality of said amplification oligonucleotide primers.

53. The kit of claim 46, further comprising at least one component adapted for incorporation labeling of target nucleic acid molecules.

54. The kit of claim 53, wherein said at least one component includes a DNA polymerase suitable for non-PCR enzymatic synthesis of target molecules.

55. The kit of claim 53, wherein said at least one component includes a hapten-linked nucleoside triphosphate or a modified nucleotide recognized by an antibody.

56. An oligonucleotide comprising

a nucleotide sequence and an incorporated label,

wherein the sequence of said oligonucleotide corresponds to a portion of a gene, said portion comprising a polymorphic site.

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57. The oligonucleotide of claim 56, wherein said oligonucleotide includes a hapten.

58. The oligonucleotide of claim 56, wherein said oligonucleotide includes a modified nucleotide that will specifically bind an antibody.